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Relationships between intelligence and self-concept parameters in children

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Abstract

The article is devoted to the analysis of self-concept and intelligence formation mechanisms in children of 6, 7, 10, 13 and 16 years of age (monozygotic twins and same-sex dizygotic twins, 94, 77, 108 and 211 pairs, respectively). Psychometric intelligence (by the Wechsler Intelligence Scale for Children – WISC) and self-concept parameters (by the Dembo-Rubinstein method) were measured. We analyzed the dynamics of inter-age and intra-age correlations. Our findings indicated the presence of reciprocal influences between self-concept and intelligence including latent and long-term ones. The integration of cognitive and personal characteristics increases with age in groups with a higher intellectual level. The results led us to the conclusion that there are complex systemic interrelations between cognitive and personal characteristics in the ontogenesis.

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1. Introduction

Self-evaluation deals with somebody's own strengths and weaknesses and is based on a subject's perceptions related to various aspects of their own personality, appearance, acts and results of activity. Self-evaluation comprises a cognitive component (self-concept) and an affective component (self-esteem). Currently, self-evaluation is viewed as a complex multidimensional construct consisting of facets that influence a subject's real

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life in a specific way [1]. For instance, academic achievements are primarily associated with academic self-concept with only slight dependence on self-esteem.

The cognitive and affective components of self-evaluation are interrelated on a structural level [2]. The clearer a person' self-concept is, the higher his self-esteem is. According to the results of the Longitudinal Study of Generations (4 generations were studied; the respondents' ages varied from 16 to 97 years), self-esteem increases from adolescence to middle adulthood [3]. Self-esteem reaches its peak at around 50 years and decreases in old age. The research including cross-lagged regression analyses has shown self-esteem to serve as a cause rather than a consequence of one's achievements and has an obvious effect on humans' real life. This is consistent with the results obtained by some other researchers [4], [5]. The question of whether it is self-esteem that influences life success and academic achievements or vice versa is controversial [6], [7]. A number of researchers [8] claim that far from determining future success, high self-esteem may even bring harm.

Many psychologists view self-concept as the cornerstone of children's development [9], [10]. The construct is believed to develop in children at an early age [11]; young children are capable of identifying different parameters of the self-concept. At the age of four or five years, a child can make standard self-evaluations [12], [13]. Davis-Kean and Sandler [14] believe that by the pre-school age children's command of language and cognitive abilities are high enough to discuss their own selves.

Although the cause-and-effect relations between the parameters of self-evaluation and other developmental characteristics are still unclarified, one may claim that children's self-esteem and self-concept are associated with numerous behavioral, academic and psychological consequences [15]. The higher the self-esteem and self-concept levels are, the better social and interpersonal relations are created between children and adolescents and the more academic success they gain [16], [17], [18]. The low levels of self-esteem and self-concept correlate with negative consequences for children and adolescent adaptation: social anxiety, alienation, suicide, alcohol and drug abuse, offences [18], [19], [20].

As a result of the meta-analysis of therapeutic interventions aimed at enhancing children's self-evaluation, it was found that improvements in the children and adolescents' self-esteem and self-concept were accompanied by significant changes in their behavior, personality sphere and academic records [21]. The actions aimed at changing self-esteem and self-concept proved to be more efficient for children's adaptation than those aimed at particular behavioral and social skills.

Young children have a very high self-concept that becomes more realistic and predictable as the person grows older [22]. This may be explained, among other things, by changes taking place during school years as children progress to each next form and competition between students becomes more and more pronounced alongside with growing differences between them [23].

The study of changes in children's self-concept with age led to the development of the Differential-Distinctiveness Hypothesis [24]. This theoretical model describes how the facets of a child's self-conception are differentiated as he or she grows older. The authors believe that the level of differentiation in children's responses increases as they grow older; however, the process appeared to be more complicated than it was thought before. Highly-correlating components of self-conception in younger children's responses have been found to retain the high correlations as the children grow older. On the contrary, the components of self-conception having but slight correlation in younger children's responses tend to become even more differentiated as the children grow.

Self-evaluation is an integral characteristic of the sense of psychological wellbeing and is closely related to the level of social adaptation. It may be supposed that the multi-factor mechanisms of the self-concept and intelligence formation are mutually connected through complex interrelations. The purpose of our study was to analyze reciprocal influences of self-concept and intelligence in order to reveal their long-term developmental effects.

2. Method

We conducted a longitudinal study of the subjects at five ages: 1) psychometric intelligence scores were obtained at 6, 7, 10, 13 and 16 years (WISC); 2) the adolescents' self-concept was measured using "Intelligence", "Happiness", "Body length" and "Good" scales at 13 years (the Dembo-Rubinstein method). Monozygotic and same-sex dizygotic twins in the age of 6, 7, 10 and 13 years (94, 77, 108, 211 pairs, respectively) participated in the study. They all lived in Moscow. The closeness and number of correlations between the parameters were assessed using the Spearman rank correlation coefficients. The significance of inter-group differences was assessed using the t-test and the chi-squared test.

3. Results and discussion

3.1. Interrelations between self-concept and intelligence parameters

Self-concept in the "Intelligence" and "Body length" scales in adolescence (13 years) is related to verbal IQ (VIQ) and general IQ (GIQ) at the age of 10 and 16 years ("Body length" is related only to VIQ). These relations are reproduced in two subsamples that randomly included one twin from each pair (the significance level from $p < 0.004$ to $p < 0.10$). Thus, intelligence at the prepubertal age of 10 years influences the adolescents' self-concept (at 13 years); and self-concept at the pubertal age of 13 years affects the level of intelligence at 16 years. It should be noted that at the age of 13 years the correlations between the characteristics measured at this age disappear which is probably due to the growth of the individual difference range. After the critical development phase, the latent relationships between the variables are restored (at 16 years). The children appeared to assess their "Intelligence" quite properly depending on their intelligence level. The relations between the evaluation of one's own body length and intelligence level may be mediated by the significance of appearance parameters in the adolescents' perception.

3.2. Gender-related differences

The closeness and number of "self-concept – IQ" relations in the girls' group were less than those in the boys' group (7 vs 20 correlations at $p < 0,05$; 14 vs 28 at $p < 0,10$; the differences were significant at $p < 0,05$, chi-square test). While for the boys' group the pubertal self-concept (at 13 years) was related to VIQ and GIQ at 6 and 10 years (in both subsamples); only one similar correlation was revealed in the girls' group, i.e. "self-concept at 13 years – VIQ at 10 years". Thus, the level of intelligence at an earlier age (at 6 and 10 years) is more important for the formation of psychological status in adolescent boys than in girls.

The structure of the relationships detected undergoes changes with age. In the boys' group, intelligence at the preschool age of 6 years is in correlation with self-concept in the "Intelligence" scale (same as in the girls' group), and the intelligence at 10 years is in correlation with self-concept in "Body length" scale, i.e. the higher the preschool boys' psychometric intelligence is, the more intelligent they seem to themselves in the period of pubertal self-definition; the higher the 10 year-old boys' intelligence is, the taller they seem to themselves at the age of 13.

3.3. Differential and psychological analysis

We formed contrast groups for the comparative analysis: Subgroup1 at each age included children whose level of intelligence was higher than that of their twin ("more intelligent"); Subgroup 2 included those whose level of intelligence was lower ("less intelligent"). Table 1 shows data on the number of correlations ($p < 0.10$) in the groups with a higher and lower level of VIQ, performance IQ (PIQ) and GIQ; the groups were formed at 6 and

16 years (a total of 12 subgroups was formed). There were no differences between the average values or dispersions between the subgroups, as the breakdown criterion was the relative (intra-pair) IQ level instead of the absolute one. Thus, we had groups that were equalized by a number of important criteria, including the common family environment.

Table 1. Number of "self-concept – IQ" correlations in the groups of children that are contrasted in their psychometric intelligence level

Criteria for "more/less intelligent subgroups' formation	Intelligence in comparison with the twin				Total
	at 6 y.o.		at 16 y.o.		
	higher	lower	higher	lower	
GIQ	3	17	9	16	45
VIQ	7	11	14	9	41g
PIQ	7	11	6	9	33
Total	17	39	29	34	119

As it is seen from the table, the integration of cognitive and personal characteristics increases with age in "more intelligent" groups. This differs from the data on the increase by the age of 16 in the cognitive sphere integration, which is said to take place in groups of subjects with both high and low intelligence figures (Pyankova, 2003).

4. Conclusion

As a result of the study of inter-age correlations' dynamics, we may conclude as follows.

1. Self-concept features in adolescents (13 years) are related to their intelligence measured both at earlier and subsequent ages. Self-concept can impact intelligence, and the intelligence level, in its turn, can have an effect on self-concept.
2. Adolescents' self-concept on the "Intelligence" scale showed the closest correlation with the intelligence figures.
3. The correlations between the intelligence and self-concept figures measured at the age of 13 are of latent nature and manifest themselves in the youth age of 16.
4. The structure of relationships between the adolescents' intelligence and their self-concept varies depending on the subjects' gender, age and intelligence level and also on a parameter under study.

The results enable us to conclude that there are complex systemic interrelations between cognitive and personal characteristics in the ontogenesis.

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